

WELL-SAMPLE RECORD NO. 41

PENNSYLVANIA GEOLOGICAL SURVEY



ALBERT NO. 1 WELL
ADAMS TOWNSHIP, SNYDER COUNTY

BY

W.R. WAGNER



COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF INTERNAL AFFAIRS


GENEVIEVE BLATT, *Secretary*

TOPOGRAPHIC AND GEOLOGIC SURVEY

CARLYLE GRAY, *State Geologist*

1958

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY

January 1959

WELL-SAMPLE RECORD

ALBERT NO. 1 WELL
Middlecreek Valley Prospecting Company

Snyder County, Pa., Adams Township

Mifflinburg Quadrangle: 1.74 miles south of 40° 50' N. Lat. and 0.44 miles east
of 77° 10' W. Long.

Completed: June 29, 1956.

Elevation: 652 feet above sea level.

Total depth: 5965 feet.

Deepest formation penetrated: Lower Rose Hill Formation (possibly Castanea
Sandstone)

Results: Dry hole

Samples: 15 to 5965 feet examined by Walter R. Wagner.

Structure: The well is located on the southern flank of the Jacks Mountain anticline
and hence, the thicknesses given in the well-sample record probably
do not represent the true stratigraphic thicknesses. In the following
table, the thicknesses measured at outcrops are contrasted with the
apparent thicknesses of the well-record, and the inferred dip of the
units is calculated.

Unit	Outcrop Thickness ¹ (feet)	Well Thickness (feet)	Inferred Dip
Hamilton Group	1450-1500	1358 +	?
Onondaga Group	170	215	36°
Lower Devonian Series	200	374 ²	57° 27'
Upper Silurian Series	2050	2718	41°
McKenzie-Rochester-Keefer	230	297	40°
Rose Hill Formation	725	1000 +	42° ±

¹Willard, Swartz, and Cleaves, (1939). The Devonian of Pennsylvania, Pa. Geological Survey, 4th Series, and Swartz, F.M., (1934), Silurian Sections near Mount Union, Central Pennsylvania, Bull., Geol. Soc. Am. Vol. 45, No. 1, pp. 81-134.

²The excessive thickness of the Lower Devonian Series is ascribable to the unbelievable thickness of the Coeymans-New Scotland Formations. The well-record shows 130 feet for these formations as compared to 15 or 20 feet in outcrop. Several alternatives are possible - a) reverse faulting has thickened the formations, b) the formational boundaries have not been correctly chosen, or, c) inferring a dip of 38° to 39° the Coeymans-New Scotland formations are actually thickened to approximately 100 feet.

Thickness Feet	Description of Strata	Depth in feet
DEVONIAN SYSTEM, 1950+ feet		
<u>Middle Devonian Series, 1576+ feet</u>		
<u>Hamilton Group (including Marcellus Shale), 1358+ feet</u>		
15	No samples.	0 - 15
5	Shale, dark- to very dark-gray, with very little greenish- to dark-greenish-gray shale; trace of hematite and and fine-grained quartzite.	15 - 20
37	Shale, dark-gray.	20 - 57
10	Shale, dark- to very dark-gray, slightly calcareous, containing nodules of bluish-gray to gray, shaly limestone.	57 - 67
27	Shale, dark-gray to gray, somewhat calcareous, with some yellowish-orange iron staining from 67-75.	67 - 94
14	Shale, dark-gray to gray, silty and somewhat calcareous, with occasional pyrite.	94 - 108
13	No samples.	108 - 121
82	Shale, dark-gray to gray, containing calcite veinlets and a little pyrite, some yellowish-brown iron staining from 147-203; trace of brownish-gray to gray, argillaceous to shaly limestone.	121 - 203
1	Siltstone, grayish-brown, dense, in part very slightly calcareous.	203 - 204
33	Shale, dark-gray, in part silty, containing a little pyrite and yellowish-brown iron staining from 204-219.	204 - 237
29	Shale, dark-gray to gray, in part silty.	237 - 266
10	Shale, gray, in part silty.	266 - 276
38	Sandstone, gray to very light-gray, very fine-grained, argillaceous and slightly calcareous, containing a little muscovite and pyrite; a little medium- to coarsely-crystalline, white calcite and a little clear to milky, angular quartz fragments up to 1.8 millimeters across.	276 - 314
30	Sandstone, light- to dark-gray, very fine-grained, argillaceous and slightly calcareous, grading into hard, dense siltstone; a little medium- to coarsely-crystalline, white calcite and a little clear to milky, angular quartz fragments.	314 - 344

Thickness Feet	Description of Strata	Depth in feet
6	Sandstone, gray to dark-gray, very fine-grained, argillaceous and somewhat calcareous, with a little dark-gray shale, in part silty and very slightly calcareous.	344 - 350
11	Sandstone, light- to dark-gray, very fine-grained, argillaceous and calcareous, with some reddish-brown iron staining.	350 - 361
6	Shale, dark- to very dark-gray, slightly calcareous and in part silty, with a little dark-gray, argillaceous and calcareous, very fine-grained sandstone.	361 - 367
23	Shale, dark-gray, somewhat calcareous, silty.	367 - 390
15	Shale, dark-gray, somewhat calcareous, in part silty, with some dark-gray, argillaceous and calcareous siltstone.	390 - 405
8	No samples.	405 - 413
72	Shale, dark-gray to gray, silty and somewhat calcareous, with very little grayish-brown, hard, dense, somewhat calcareous siltstone.	413 - 485
7	No samples.	485 - 492
18	Shale, dark-gray to gray, silty, sandy, and calcareous, with a little gray to light-brownish-gray, argillaceous and calcareous, very fine-grained sandstone (almost a coarse siltstone).	492 - 510
19	Sandstone, gray, very fine-grained, argillaceous and somewhat calcareous, containing some calcite veinlets, with a little dark-gray shale, in part silty and sandy.	510 - 529
19	Shale, dark-gray, in part silty and in part very slightly calcareous.	529 - 548
5	Shale, dark-gray, with a little gray, argillaceous, very slightly calcareous siltstone.	548 - 553
15	Shale, dark- to very dark-gray, in part silty.	553 - 568
8	Shale, very dark- to dark-gray, silty and in part sandy.	568 - 576
23	Shale, very dark- to dark-gray, in part silty.	576 - 599
16	Shale, very dark- to dark-gray, in part silty and sandy.	599 - 615

Thickness Feet	Description of Strata	Depth in feet
24	Shale, dark- to very dark-gray, in part silty.	615 - 639
87	Shale, dark- to very dark-gray, occasionally silty; trace of light-gray to very light-brownish-gray, finely to medium-crystalline calcite.	639 - 726
22	Shale, very dark-brownish-gray to very dark-gray, with occasional light-grayish-brown, medium-crystalline calcite.	726 - 748
12	Shale, grayish-black to black.	748 - 760
4	Shale, black, with great deal of very dark-brownish-gray claystone.	760 - 764
41	Shale, very dark-gray to grayish-black.	764 - 805
45	Shale, dark-gray to grayish-black, containing veinlets of light-brownish-gray to white, coarsely crystalline calcite and occasional pyrite.	805 - 850
23	Shale, grayish-black to very dark-gray.	850 - 873
12	Shale, dark-gray to grayish-black.	873 - 885
18	Shale, dark-gray to grayish-black, containing veinlets composed of quartz, medium-crystalline calcite, and pyrite.	885 - 903
20	Shale, dark-gray to grayish-black.	903 - 923
5	Shale, very dark-gray, with considerable dark-brownish-gray claystone.	923 - 928
56	Shale, dark-gray to grayish-black, in part silty.	928 - 984
30	Shale, very dark- to dark-gray, in part silty and in part very slightly calcareous.	984 - 1014
6	Shale, very dark-gray, containing a little pyrite, with a little dark-brownish-gray claystone.	1014 - 1020
33	Shale, very dark-gray, slightly calcareous.	1020 - 1053
25	Shale, very dark-gray, calcareous, containing nodules of dark-grayish-brown, very finely-crystalline limestone in lower 11 feet.	1053 - 1078
29	Shale, gray, very calcareous and in part silty, containing a little pyrite and veinlets of finely to coarsely crystalline calcite, with a little very dark-gray, slightly calcareous shale.	1078 - 1107
15	Shale, gray to dark-gray, very calcareous.	1107 - 1122

Thickness Feet	Description of Strata	Depth in feet
11	Shale, dark- to very dark-gray, calcareous, in part silty.	1122 - 1133
50	Shale, very dark-gray, somewhat calcareous and in part silty, containing a little pyrite.	1133 - 1183
6	Shale, very dark-brownish-gray, slightly calcareous, in part silty, and containing a little pyrite.	1183 - 1189
14	Shale, very dark-gray, somewhat calcareous, in part silty and sandy, containing a little pyrite.	1189 - 1203
34	Shale, very dark- to dark-gray, slightly calcareous silty and sandy, containing a little pyrite.	1203 - 1237
37	Shale, very dark-gray, in part slightly calcareous, in part calcareous, in part silty and containing a little pyrite.	1237 - 1274
12	Shale, very dark-brownish-gray to very dark-gray, slightly calcareous.	1274 - 1286
33	Shale, very dark-gray, slightly calcareous, containing a little pyrite.	1286 - 1319
31	Shale, very dark-gray, slightly calcareous, containing a little pyrite and inclusions of grayish-white, coarsely crystalline calcite.	1319 - 1350
8	Shale, very dark-gray and brownish-black, very calcareous, containing inclusions of grayish-white coarsely crystalline calcite, and a little pyrite.	1350 - 1358

Onondaga Group, 215 feetSelinsgrove Limestone, 42 feet

32	Limestone, brownish- to dark-brownish-gray, very finely crystalline and argillaceous, also dark- to light-gray and shaly; considerable very dark-gray, somewhat calcareous shale; a little light- to medium-brown metabentonite and metabentonitic? claystone and shale, in part containing coarse muscovite flakes; a little grayish- white to white, finely to medium-crystalline calcite.	1358 - 1390
3	Shale, gray and very dark-gray, calcareous; a little grayish-white to clear, medium- to coarsely-crystalline calcite, and a trace of light-brown metabentonitic? claystone containing coarse muscovite flakes.	1390 - 1393
7	Limestone, light-gray to gray, dense to very finely clastic, argillaceous (metabentonitic?), with some	

Thickness Feet	Description of Strata	Depth in feet
	very dark- to dark-gray, calcareous shale, and a little grayish-white to clear, medium- to coarsely crystalline calcite.	1393 - 1400
	<u>Needmore Shale, 173 feet</u>	
29	Shale, light- to very dark-gray, calcareous, in part gradational to limestone above; a little brownish-white to clear, finely to medium-crystalline calcite, and a very little light-grayish- to grayish-brown metabentonitic? claystone, containing considerable muscovite.	1400 - 1429
31	Shale, gray to very dark-gray, calcareous, with some reddish-orange iron staining from 1444 - 1460.	1429 - 1460
15	Shale, gray to dark-gray, calcareous, containing a very little pyrite.	1460 - 1475
37	Shale, dark-gray, slightly calcareous.	1475 - 1512
39	Shale, dark-gray.	1512 - 1551
25	Shale, dark-gray, in part slightly calcareous.	1551 - 1576
	<u>Lower Devonian Series, 374 feet?</u>	
	<u>Oriskany Group, 94 feet?</u>	
2	Shale, gray to brownish-gray, containing an olive-colored concretion 1.5 millimeters in diameter and a little well-rounded to subangular, fine- to medium-grained, clear, quartz sand.	1576 - 1578
3	Shale, gray to dark-gray, containing a little pyrite, with considerable gray, finely crystalline limestone, slightly argillaceous and containing considerable subangular, fine- to medium-grained quartz sand.	1578 - 1581
14	Limestone, brownish-gray to grayish-white, very fine- to fine-textured, containing considerable angular to subrounded, fine- to coarse-grained quartz sand; a great deal of gray to dark-gray shale, containing a little pyrite.	1581 - 1595
11	Limestone, light-grayish-brown to very light-gray, finely crystalline, containing considerable subangular to rounded, fine- to very fine-grained quartz and a little grayish-brown to bluish-gray, transparent to translucent chert; considerable dark-gray to gray shale containing a little pyrite.	1595 - 1606

Thickness Feet	Description of Strata	Depth in feet
10	Shale, dark-gray, containing some pyrite, with a little dark- to light-brownish-gray, very finely crystalline limestone containing some light-grayish- to grayish-brown chert.	1606 - 1616
41	Limestone, dark- to light-gray, finely crystalline, in part argillaceous, and containing some fine-grained sand and some light-grayish-brown chert; some dark-gray to gray shale.	1616 - 1657
13	Limestone, very dark- to dark-gray, very finely crystalline, almost dense, argillaceous and cherty; also a brownish-gray to gray, finely to very finely crystalline limestone, silty and in part argillaceous; some dark- to very dark-gray, very slightly calcareous shale.	1657 - 1670
<u>Helderberg Group, 280 feet</u>		
<u>Mandata Formation, 150 feet</u>		
39	Shale, very dark- to dark-gray, silty, cherty and very calcareous, containing a few brachiopod fragments.	1670 - 1709
5	Shale, very dark-gray, calcareous, containing considerable light-grayish-brown chert.	1709 - 1714
2	Chert, dark-brownish-gray, argillaceous, and in part calcareous, translucent in thin pieces, containing a few calcite rhombs.	1714 - 1716
4	No samples.	1716 - 1720
16	Chert, dark-brownish-gray and dark-gray, argillaceous and somewhat calcareous, with a few calcite rhombs and a little very dark-gray, slightly calcareous, silty shale containing considerable chert.	1720 - 1736
22	Shale, dark-brownish-gray to dark-gray, calcareous and in part cherty, with some light- to dark-grayish-brown, argillaceous chert, somewhat calcareous and in part translucent.	1736 - 1758
22	Shale, dark-gray, calcareous and cherty, with a very little grayish-brown, argillaceous, and somewhat to slightly calcareous chert.	1758 - 1780
8	Shale, dark-gray, calcareous, and in part cherty.	1780 - 1788
32	Shale, very dark- to dark-gray, silty and calcareous.	1788 - 1820

Thickness Feet	Description of Strata	Depth in feet
<u>New Scotland - Coeymans? Formations, 130 feet</u>		
15	Limestone, dark-brownish- to very light-brownish-gray, very finely crystalline, in part almost dense, in part argillaceous and containing a few shell fragments; some dark-gray to gray, calcareous shale.	1820 - 1835
10	Limestone, brownish- to very light-brownish-gray, finely to very finely crystalline, slightly argillaceous, containing some brownish-gray chert and shell fragments; a great deal of dark-gray, calcareous shale.	1835 - 1845
16	Limestone, brownish- to dark-brownish-gray, dense to very finely crystalline, slightly argillaceous and very silty, in part gradational to silty shale; some gray to light-gray, very fine-textured, soft, earthy limestone containing a few shell fragments.	1845 - 1861
20	Shale, gray to dark-gray, very calcareous, grading into shaly limestone, with a little dark-brownish-gray, dense to very finely crystalline, argillaceous limestone.	1861 - 1881
7	Limestone, dark- to light-brownish-gray, very finely crystalline, almost dense, in part argillaceous and in part silty; some gray to dark-gray, very calcareous shale; trace of very light-gray, very fine-textured, soft, earthy limestone.	1881 - 1888
12	Limestone, dark- to light-brownish-gray, dense, in part argillaceous, and containing an occasional shell fragment; some light-gray to gray, very fine-textured, soft, earthy limestone.	1888 - 1900
5	Limestone, light-gray to gray, very fine-textured, soft, earthy, argillaceous and silty; considerable dark-brownish- to dark-gray, very finely crystalline, argillaceous limestone, grading into shaly limestone; some dark- to very dark-gray shale, slightly calcareous to calcareous.	1900 - 1905
9	Shale, gray, somewhat calcareous to calcareous, with considerable light-gray to gray, soft, earthy, argillaceous limestone, containing some shell fragments.	1905 - 1914
36	Shale, gray, calcareous and in part silty, with a little gray to light-gray, very fine-textured, silty limestone.	1914 - 1950

Thickness Feet	Description of Strata	Depth in feet
<u>SILURIAN SYSTEM, 4015⁺ feet</u>		
<u>Upper Silurian Series, 2718 feet</u>		
<u>Keyser Limestone, 193 feet</u>		
24	Limestone, dark-brownish- to dark-gray, very finely crystalline, argillaceous, with considerable light-gray, very fine-textured, argillaceous and silty limestone; both lithologies contain shell fragments.	1950 - 1974
11	Limestone, light-gray, very fine-textured, argillaceous and in part silty, with a little dark-gray, calcareous shale.	1974 - 1985
52	Limestone, dark-brownish- to dark-gray and gray, dense to very finely crystalline, in part argillaceous and grading into shaly limestone, containing some shell fragments and crinoid columnals.	1985 - 2037
35	Limestone, dark-gray to dark-brownish-gray, shaly to dense, with a little gray, very fine-textured, argillaceous and silty limestone.	2037 - 2072
17	Limestone, dark- to light-gray, shaly, with considerable very dark-brownish-gray, dense limestone.	2072 - 2089
5	Limestone, dark-brownish-gray, dense, with a little light-gray, shaly limestone.	2089 - 2094
18	Limestone, dark-gray, shaly, with a little dark-brownish-gray, dense limestone.	2094 - 2112
10	Limestone, dark-brownish- to very dark-gray, shaly.	2112 - 2122
21	Limestone, brownish-gray and very dark-gray, slightly argillaceous.	2122 - 2143
<u>Tonoloway Formation, 1215 feet</u>		
17	Limestone, brownish-gray and very dark-gray, in part dense and argillaceous, in part shaly, in part dolomitic; a little grayish-white to white, very finely crystalline anhydrite, and a little dark-gray calcareous shale.	2143 - 2160
20	Limestone, dark-gray to gray, shaly and dolomitic, containing a little anhydrite; some brownish-gray, dense limestone containing very thin, black shale laminae.	2160 - 2180
30	Limestone, brownish- to dark-brownish-gray, dense, slightly argillaceous and in part dolomitic, exhibits	

Thickness Feet	Description of Strata	Depth in feet
	hackly fracture; considerable dark-gray, shaly limestone and a few calcite rhombs.	2180 - 2210
8	Shale, light-gray, somewhat calcareous; considerable dark-brownish-gray and dark-gray, slightly argillaceous, dense limestone, in part dolomitic; trace of white, very finely crystalline anhydrite.	2210 - 2218
12	Shale, light- to dark-gray, calcareous and in part silty.	2218 - 2230
10	Anhydrite, pinkish-gray to white, very finely crystalline, in part slightly calcareous and slightly argillaceous.	2230 - 2240
19	Limestone, brownish- to dark-brownish-gray, very finely crystalline, dolomitic and slightly argillaceous to argillaceous.	2240 - 2259
17	Shale, greenish-gray, slightly dolomitic; considerable gray to dark-gray, very finely crystalline, dolomitic and argillaceous limestone; a little light-gray, very finely crystalline anhydrite.	2259 - 2276
5	No samples.	2276 - 2281
58	Limestone, gray to dark-gray and brownish-gray, dolomitic, varies from very finely crystalline, argillaceous and anhydritic to shaly; in general the lighter colored lithologies are anhydritic and the darker colored ones are argillaceous to shaly.	2281 - 2339
3	Shale, dark-gray, slightly dolomitic.	2339 - 2342
40	Limestone, brownish-black to brownish-gray, dense to very finely crystalline, in part shaly, argillaceous and dolomitic, containing a little encrusting, white, very finely to finely crystalline anhydrite; trace of pink, calcareous shale from 2362 to 2368 and from 2375 to 2382.	2342 - 2382
18	Limestone, dark-gray to gray, very finely crystalline to dense, argillaceous and in part dolomitic; some white to light-gray, very finely crystalline anhydrite and a little dark-gray shale, in part slightly dolomitic.	2382 - 2400
21	Shale, gray to greenish- and brownish-gray, slightly dolomitic to somewhat calcareous.	2400 - 2421
38	Limestone, brownish-gray to gray, dense to very finely crystalline, argillaceous, somewhat dolomitic to dolomitic, containing a little anhydrite; considerable gray to dark-gray, slightly dolomitic shale.	2421 - 2459

Thickness Feet	Description of Strata	Depth in feet
28	Limestone, brownish- to dark-brownish-gray, very finely crystalline, argillaceous, somewhat dolomitic, containing a little anhydrite; some dark-gray, slightly dolomitic shale.	2459 - 2487
27	No samples.	2487 - 2514
10	Limestone, brownish- to dark-brownish-gray, very finely crystalline, argillaceous, somewhat dolomitic; some white, crystalline anhydrite; considerable dark-gray, slightly dolomitic shale containing a little pyrite; trace of pink calcareous shale.	2514 - 2524
12	No samples.	2524 - 2536
7	Shale, brownish-gray to dark-gray, slightly dolomitic; some white to light-gray, very finely crystalline, calcareous anhydrite.	2536 - 2543
23	Limestone, light-grayish-brown and dark-brownish-gray, dense, slightly argillaceous and dolomitic, in part finely laminated dark-grayish-brown and dark-brownish-gray, containing a little anhydrite, in part calcareous; some dark-gray, dolomitic shale in lower 6 feet.	2543 - 2566
42	Shale, dark- to very dark-gray, dolomitic, very thinly laminated in upper 15 feet, containing a little pyrite; a little dense, dark-brownish-gray, dolomitic and slightly argillaceous limestone; some white, crystalline anhydrite, and a few calcite fragments; considerable brownish-orange iron-staining in lower 30 feet.	2566 - 2608
7	Anhydrite, light-gray, very finely crystalline, argillaceous and somewhat dolomitic to calcareous; some dense, brownish-gray, slightly argillaceous and dolomitic limestone, and some dark-gray, dolomitic shale.	2608 - 2615
9	Limestone, grayish-brown, dense, somewhat dolomitic, containing considerable anhydrite; some light- to dark-gray, dolomitic shale containing a little pyrite.	2615 - 2624
10	Limestone, light- to dark-grayish-brown and dark-gray, dense to very finely crystalline, in part somewhat dolomitic and argillaceous; considerable very finely crystalline, light-grayish-brown anhydrite.	2624 - 2634
18	Limestone, brownish-gray to gray, dense to very finely crystalline, dolomitic, containing considerable anhydrite; some very fine-textured, dark-gray,	

Thickness Feet	Description of Strata	Depth in feet
	argillaceous limestone, in part somewhat dolomitic, and a little finely to coarsely crystalline, white to clear dolomite; very little, slightly calcareous pink shale in lower 7 feet.	2634 - 2652
23	Limestone, dark-brownish-gray to gray, dense to very finely crystalline, in part argillaceous and somewhat dolomitic, containing some anhydrite; a great deal of dark-gray, calcareous to slightly dolomitic shale, containing a little pyrite.	2652 - 2675
23	Limestone, brownish-gray to grayish-brown, dense to very finely crystalline, in part argillaceous and somewhat dolomitic, containing a little anhydrite.	2675 - 2698
28	Limestone, light-brownish-gray, very finely crystalline, somewhat dolomitic, containing a great deal of anhydrite; considerable dark-gray to gray very dolomitic shale (almost a dolomitic limestone.)	2698 - 2726
20	Limestone, brownish- to dark-brownish-gray, dense, somewhat dolomitic to dolomitic, in part argillaceous, in part laminated with very dark-gray dolomitic shale; a little, very finely crystalline, light-brownish- to very light-gray, calcareous to dolomitic anhydrite.	2726 - 2746
20	Shale, brownish- to greenish-gray and dark-gray, dolomitic and containing a little anhydrite.	2746 - 2766
12	Limestone, brownish-gray, dense, in part mottled; a little dense, calcareous and argillaceous anhydrite.	2766 - 2778
41	Limestone, brownish-gray to dark-gray, dense to shaly, somewhat dolomitic to dolomitic, containing a little anhydrite; considerable gray to greenish-gray, dolomitic shale; a little very finely crystalline, light-gray anhydrite, interbedded with dark-gray shale and dolomitic limestone in lower 9 feet.	2778 - 2819
37	Limestone, brownish- to dark-brownish- and dark-gray, dense to shaly, argillaceous and dolomitic, containing some anhydrite; a little dark-gray, dolomitic shale, a few quartz fragments and a trace of slightly calcareous, brick-red shale.	2819 - 2856
6	Shale, gray to dark-gray, dolomitic, laminated, containing considerable muscovite; a little very finely crystalline, light-grayish-brown to brownish-gray limestone, in part argillaceous, somewhat dolomitic, and containing a little anhydrite.	2856 - 2862

Thickness Feet	Description of Strata	Depth in feet
9	Limestone, gray to dark-gray, shaly, with a little anhydrite.	2862 - 2871
12	Shale, dark-gray to gray, calcareous, containing a little anhydrite; a little very finely crystalline, brownish-gray, argillaceous limestone, and a very little orange-yellow, silty and sandy shale containing some muscovite.	2871 - 2883
24	Limestone, brownish-gray to gray, dense to very finely crystalline, argillaceous and in part somewhat dolomitic, with a little anhydrite.	2883 - 2907
25	Limestone, dark-gray, shaly, in part somewhat dolomitic.	2907 - 2932
64	Limestone, brownish- to dark-brownish and dark-gray, dense to very finely crystalline, argillaceous and in part somewhat dolomitic to dolomitic, with a little anhydrite.	2932 - 2996
54	Limestone, light- and dark-brownish-gray to dark-gray, dense to very finely crystalline, dolomitic to somewhat dolomitic, in part argillaceous and in part containing very thin laminae of dark-gray shale, slightly anhydritic; a great deal of greenish-gray to dark-gray, dolomitic shale containing a little pyrite and argillaceous? specks and needles.	2996 - 3050
12	Anhydrite, light-gray to light-brownish-gray, very finely crystalline, in part argillaceous; a great deal of dark-gray, dolomitic shale containing a little pyrite; a little dense, dark-brownish-gray dolomitic limestone.	3050 - 3062
54	Shale, greenish-gray to gray, very dolomitic, with a little very finely crystalline, light-gray to clear anhydrite, and a very little brownish-yellow, silty and sandy shale in upper part.	3062 - 3116
20	Shale, greenish-gray to gray, containing very little anhydrite; a little dense, gray to brownish-gray, argillaceous and dolomitic limestone.	3116 - 3136
56	Shale, greenish-gray to gray, somewhat calcareous to dolomitic; a little clear, very finely crystalline anhydrite, and a little brownish-gray, very finely crystalline to dense limestone, in part somewhat dolomitic.	3136 - 3192
10	No samples.	3192 - 3202
61	Shale, dark-brownish- to dark-gray to gray, cal-	

Thickness Feet	Description of Strata	Depth in feet
	careous to dolomitic, with a little anhydrite.	3202 - 3263
10	No samples.	3263 - 3273
18	Shale, greenish-gray to gray, dolomitic, with a little anhydrite; a great deal of dense, light-brownish- to dark-gray, argillaceous limestone in part dolomitic.	3273 - 3291
37	Shale, gray, greenish- and brownish-gray, in part dolomitic, with a little anhydrite; considerable brownish-gray to dark-gray shaly limestone; some white, finely crystalline calcite and a few pieces of gypsum from 3312-3320.	3291 - 3328
30	Limestone, grayish- to dark-grayish-brown, dense, in part shaly; some finely crystalline white to light-gray calcite.	3328 - 3358
	<u>Wills Creek Formation, 706 feet</u>	
33	Shale, greenish- to brownish-gray to gray, dolomitic, with very little anhydrite and calcite cleavage fragments.	3358 - 3391
28	Shale, dark-gray to gray, calcareous to dolomitic, with very little anhydrite.	3391 - 3419
35	Shale, greenish-gray, slightly dolomitic, with a great deal of dark-gray to gray dolomitic shale, in part silty, a little pyrite present.	3419 - 3454
41	Shale, greenish-gray, slightly dolomitic, with considerable gray, slightly dolomitic to calcareous shale (in part almost a limestone).	3454 - 3495
45	Shale, grayish-green to greenish-gray, somewhat calcareous, with considerable gray to dark-gray calcareous shale.	3495 - 3540
19	Shale, grayish-green to greenish-gray, calcareous.	3540 - 3559
6	No samples.	3559 - 3565
20	Shale, grayish-green, calcareous, with some pinkish-gray, somewhat calcareous shale.	3565 - 3585
24	Shale, grayish-green, calcareous, with some gray calcareous shale.	3585 - 3609
21	Shale, grayish-green to greenish-gray, calcareous and in part silty; some gray to brownish-gray, calcareous shale, in part silty; a little pinkish-gray, calcareous shale in upper 11 feet and a little gray, shaly limestone in lower 10 feet.	3609 - 3630

Thickness Feet	Description of Strata	Depth in feet
11	Shale, grayish-green, greenish-gray and gray, silty and somewhat calcareous.	3630 - 3641
17	Shale, spotted greenish- to purplish-gray and brick-red, very silty, and in part sandy, hard, slightly calcareous; a great deal of grayish-green to greenish-gray, silty and slightly calcareous shale.	3641 - 3658
7	Siltstone, grayish-green, slightly calcareous, containing some medium- to coarse-grained, well-rounded, frosted quartz sand; some grayish-green, silty and slightly calcareous shale; a little spotted purplish-gray and brick-red, silty, and very slightly calcareous shale; trace of white, fine- to very fine-grained, subrounded sandstone. <u>Lower sandstone horizon of Wills Creek?</u>	3658 - 3665
11	Shale, greenish-gray to gray to grayish-green, in part silty, somewhat calcareous, with a little light-gray to gray, very calcareous siltstone.	3665 - 3676
19	Shale, grayish-green, greenish-gray and gray, in part silty, somewhat calcareous, containing occasional shell impressions; a very little gray, shaly dolomite containing a few shell fragments.	3676 - 3695
21	Shale, gray to grayish-green and greenish-gray, in part silty, slightly calcareous; a little very finely crystalline to dense, gray dolomitic limestone; some white, very finely crystalline anhydrite.	3695 - 3716
58	Shale, grayish-green to greenish-gray and gray, silty and slightly to somewhat calcareous, with a little brownish-gray to gray, shaly limestone and dolomite, and a little anhydrite.	3716 - 3774
21	Shale, grayish-green to gray, calcareous, in part silty, in part containing a little very fine- to fine-grained, rounded and frosted quartz sand; trace of white crystalline anhydrite.	3774 - 3795
21	Shale, grayish-green to greenish-gray, calcareous, with considerable brick-red and purplish-gray spotted calcareous shale.	3795 - 3816
23	Shale, dark-gray to brownish-gray, hard, calcareous, containing vugs filled with pink and white calcite; some grayish-green to greenish-gray, calcareous shale.	3816 - 3839
81	Shale, grayish-green to dark-gray, in part silty, calcareous, occasionally very hard, almost a	

Thickness Feet	Description of Strata	Depth in feet
	limestone, containing vugs filled with pink calcite; a little grayish-red to reddish-gray and brick-red shale, in part silty and in part slightly calcareous.	3839 - 3920
13	Shale, brick-red, calcareous, with some grayish- to brownish-green and dark-gray, somewhat calcareous shale.	3920 - 3933
37	Shale, grayish-green to greenish-gray and dark- gray to gray, calcareous and in part silty; some brick-red, calcareous shale, in part silty.	3933 - 3970
19	Shale, greenish-gray to grayish-green and dark-gray, calcareous, with a little brick-red to purplish- gray, calcareous shale.	3970 - 3989
17	Shale, greenish- to brownish-gray to dark-gray, in part silty and sandy, and in part calcareous.	3989 - 4006
40	Shale, grayish- to dark-grayish-green, in part silty, somewhat to slightly calcareous; a great deal of dark-gray, hard, calcareous shale, in part silty; considerable brownish-gray, sandy siltstone in lower 10 feet.	4006 - 4046
9	Limestone, brownish- to dark-brownish-gray, shaly and very silty, with a little greenish-gray shale, in part silty.	4046 - 4055
9	Shale, grayish-green to very light-greenish-gray, slightly calcareous; some gray, calcareous shale; trace of anhydrite.	4055 - 4064
<u>Bloomsburg Formation, 604 feet</u>		
21	Shale, pink to brick-red, calcareous, with considerable grayish-green to very light-greenish-gray, somewhat calcareous to calcareous shale.	4064 - 4085
6	Shale, pink to brick-red, calcareous.	4085 - 4091
38	Shale, brick- to purplish-red, somewhat calcareous, with a little very light-greenish-gray, somewhat calcareous shale.	4091 - 4129
31	Shale, brick-red, calcareous, containing a little muscovite, in part silty in lower 8 feet.	4129 - 4160
29	Shale, brick- to purplish-red, dominantly silty, in part sandy, in part somewhat calcareous.	4160 - 4189
22	Shale, purplish- to brick-red, dominantly silty and and sandy, few non-silty and sandy pieces are	

Thickness Feet	Description of Strata	Depth in feet
	somewhat calcareous; very little greenish- to light-greenish-gray shale, in part calcareous.	4189 - 4211
4	Shale, purplish- to brick-red, dominantly silty and sandy, in part somewhat calcareous, containing a few gray, platy shale? fragments; a little light-greenish-gray, somewhat calcareous, sandy siltstone.	4211 - 4215
48	Shale, brick- to purplish-red, in part silty and sandy, somewhat calcareous to calcareous.	4215 - 4263
16	Shale, brick-red, calcareous.	4263 - 4279
28	Shale, purplish-red, in part silty, calcareous, containing a few gray, platy shale? fragments, the traces of which give a bladed appearance; a little brick-red, calcareous claystone, and some greenish- to dark-gray, calcareous shale, in part silty.	4279 - 4307
13	Shale, purplish- to brick-red, in part silty.	4307 - 4320
13	No samples.	4320 - 4333
12	Shale, brick- to purplish-red, somewhat calcareous, a few pieces containing considerable gray, platy, very calcareous fragments; a little interbedded greenish-gray, slightly calcareous shale.	4333 - 4345
7	No samples.	4345 - 4352
26	Shale, purplish- to brick-red, somewhat calcareous, with very little dark-gray to greenish-gray, calcareous shale.	4352 - 4378
13	Shale, purplish- to brick-red, in part silty, calcareous, with a little dark-gray, calcareous siltstone.	4378 - 4391
2	Siltstone, bluish-gray to dark-gray, argillaceous and in part sandy, very calcareous.	4391 - 4393
16	Shale, purplish- to brick-red, in part silty, slightly to somewhat calcareous; some purplish- to dark-gray, very calcareous siltstone, and some greenish-gray, somewhat calcareous shale.	4393 - 4409
46	Shale, purplish- to brick-red, calcareous, containing platy fragments of shaly limestone from 4432-4440.	4409 - 4455
103	Shale, purplish- to brick-red, calcareous to somewhat calcareous, in part silty in upper 30 feet.	4455 - 4558

Thickness Feet	Description of Strata	Depth in feet
73	Shale, brick- to purplish-red, calcareous, with a little light-greenish-gray calcareous shale.	4558 - 4631
4	Shale, brick- to purplish-red, in part silty, calcareous; considerable light-greenish-gray to grayish-green calcareous shale, dominantly silty and hard; a little bluish-gray to gray, silty, calcareous shale, containing a little pyrite.	4631 - 4635
22	Shale, brick- to purplish-red, in part silty, calcareous, with a little light-greenish-gray to grayish-green, hard, dense, silty and calcareous shale.	4635 - 4657
11	Shale, brick-red to purplish-red, in part silty, calcareous with considerable light-greenish-gray, silty and calcareous shale.	4657 - 4668
<u>Middle Silurian Series, 1297⁺ feet</u>		
<u>McKenzie Formation, 191 feet ?</u>		
28	Shale, dark-gray to gray, calcareous, containing a little pyrite, in part thinly laminated with dark-gray shaly and silty limestone; considerable brick-red, calcareous shale; a little greenish-gray, calcareous shale, in part silty; a little very dark-gray, very fine-textured, extremely silty limestone in lower 6 feet.	4668 - 4696
8	Shale, dark-gray to gray, in part silty, calcareous, containing a little muscovite; (considerable brick- to purplish-red, calcareous shale - contamination?).	4696 - 4704
17	Shale, dark-gray, in part silty, calcareous, gradational to considerable dark-gray, very argillaceous and calcareous siltstone and silty limestone, in part heavily laden with shell fragments, mostly brachiopods?, one fragment of trilobite cephalon, <u>Calymene?</u> ; (little brick-red, calcareous shale - contamination?).	4704 - 4721
9	Siltstone, very dark-gray, argillaceous and very calcareous, containing considerable ostracods, gradational to silty limestone; considerable dark-gray to gray, calcareous and laminated shale; (some interbedded brick-red calcareous shale - contamination?).	4721 - 4730
6	Shale, very dark- to dark-gray, in part silty and hard, calcareous, containing some pyritized ostracods; (with a little brick-red, calcareous shale - contamination?).	4730 - 4736

Thickness Feet	Description of Strata	Depth in feet
24	Siltstone, very dark-gray, argillaceous and very calcareous containing some ostracods and some pyrite; some gray, calcareous shale; (little brick-red and grayish-pink, calcareous shale - contamination?).	4736 - 4760
13	Shale, grayish-black to very dark-gray, silty and calcareous, hard, containing some pyrite.	4760 - 4773
7	Shale, dark-gray, calcareous, with considerable very dark-gray, argillaceous and very calcareous, hard siltstone, in part sandy.	4773 - 4780
65	Shale, very dark- to dark-gray, in part silty, calcareous, containing an occasional ostracod and a little pyrite; (some slightly calcareous, brick-red to pink shale from 4806-4816 - contamination?).	4780 - 4845
7	Limestone, grayish-black, shaly to fine bioclastic; considerable very dark-gray, calcareous shale; (a little brick-red to pink, slightly calcareous shale - contamination?).	4845 - 4852
7	Limestone, dark-gray, fine clastic, argillaceous and in part silty, containing an occasional ostracod, fragments of grayish-black shaly limestone, and a little pyrite; a little dark-gray, calcareous shale containing a little muscovite; (a little brick-red to pink, somewhat calcareous shale - contamination?).	4852 - 4859
<u>Clinton Group</u> , 1106 ⁺ feet?		
<u>Rochester Shale</u> , 53 feet?		
40	Shale, dark-gray to gray, calcareous to slightly calcareous, containing a little muscovite, with some interbedded very dark-gray, shaly limestone, containing abundant black shell fragments and a little pyrite.	4859 - 4899
13	Shale, dark-gray, in part silty, slightly calcareous, containing a little muscovite; a little dark-gray to dark-brownish-gray, argillaceous and silty, dense limestone.	4899 - 4912
<u>Keefer Formation</u> , 53 feet?		
7	Shale, dark-gray, in part silty, slightly calcareous, with considerable dark- to very dark-gray, argillaceous, calcareous siltstone, in part sandy.	4912 - 4919

Thickness Feet	Description of Strata	Depth in feet
6	Sandstone, very light- to dark-gray, quartzitic, very fine- to fine-grained, very slightly calcareous; considerable dark-gray to gray, slightly calcareous, fissile shale.	4919 - 4925
11	Sandstone, very light-gray, quartzitic, very fine- to fine-grained, containing rounded, translucent quartz sand, with some dark-gray, slightly calcareous shale, in part silty.	4925 - 4936
29	Shale, gray to dark-gray, dominantly silty, hard, slightly calcareous, grading to siltstone; some very light-greenish-gray, very fine-grained, quartzitic sandstone grading to siltstone.	4936 - 4965
<u>Rose Hill Formation, 1000⁺ feet?</u>		
8	Shale, gray to dark-gray, silty and somewhat calcareous.	4965 - 4973
23	Siltstone, gray to greenish-gray, argillaceous and in part sandy, somewhat calcareous to calcareous.	4973 - 4996
16	Shale, light-grayish-green, in part silty, slightly calcareous, with some light-greenish-gray siltstone, somewhat to slightly calcareous and in part sandy.	4996 - 5012
41	Shale, light-grayish-to grayish-green, in part silty, very slightly calcareous; considerable light-grayish to grayish-green siltstone, slightly to somewhat calcareous in upper 30 feet, becoming increasingly sandy with depth; trace of calcite.	5012 - 5053
10	Shale, grayish-green, in part silty; considerable multi-colored, very fine- to very coarse-grained, slightly arkosic sandstone, brownish- to greenish-yellow (iron staining) and greenish- to dark-gray, quartz grains transparent to opaque, some rounded, averages very fine- to fine-grained, little muscovite.	5053 - 5063
7	Shale, grayish-green to greenish-gray, in part silty; some gray, fissile shale; a little grayish to dark-grayish-green siltstone, in part sandy; trace of calcite.	5063 - 5070
30	Shale, grayish-green, with considerable gray to pinkish-gray, fissile shale.	5070 - 5100
16	Shale, grayish-green to greenish-gray, in part silty; some gray to pinkish-gray shale; some multi-colored, very fine- to very coarse-grained,	

Thickness Feet	Description of Strata	Depth in feet
	slightly calcareous sandstone stained by iron oxide, brownish- to grayish-yellow and reddish-gray, average size— very fine- to fine-grained, angular to well-rounded.	5100 - 5116
22	Shale, grayish-green, in part silty and sandy, slightly calcareous; a little dark-grayish-green, slightly calcareous siltstone; a little purplish-gray, slightly calcareous shale; a very little light-yellow, very calcareous clay, containing abundant angular to rounded, very fine- to very coarse-grained quartz and red and gray shale fragments.	5116 - 5138
14	No samples.	5138 - 5152
33	Shale, greenish-gray to gray, silty and in part sandy, slightly calcareous; a little dark-grayish-green, sandy and slightly calcareous siltstone in lower 16 feet; a little light-yellow, calcareous clay, containing abundant very fine- to coarse-grained, angular to rounded quartz and some red and gray shale fragments in lower 23 feet.	5152 - 5185
25	Shale, gray to greenish-gray to grayish-green, in part silty, very slightly calcareous; some dark-greenish-gray to gray, sandy, very slightly calcareous siltstone; a very little very fine- to medium-grained, calcareous sandstone, iron-stained brownish- to greenish-yellow and brownish-orange.	5185 - 5210
25	Shale, grayish-green; considerable dark-gray to gray, silty and calcareous shale; a little grayish-green sandy siltstone; trace of very dark-gray, silty limestone.	5210 - 5235
82	Shale, grayish-green to greenish-gray, with a little greenish-gray siltstone; trace of greenish-gray and yellowish-brown sandstone.	5235 - 5317
83	Shale, light-greenish-gray, in part silty, with some greenish-gray siltstone.	5317 - 5400
46	Shale, greenish-gray, in part silty, with some dark-greenish gray to grayish-green siltstone, in part sandy.	5400 - 5446
93	Shale, grayish-green to greenish-gray to gray, in part silty, with some grayish-green to dark-greenish-gray siltstone.	5446 - 5539
13	Shale, grayish-green to gray, in part silty, with considerable dark- to light-purplish gray and greenish-gray, sandy siltstone.	5539 - 5552

Thickness Feet	Description of Strata	Depth in feet
43	Shale, grayish-green to gray, with a little dark-grayish-green siltstone, in part sandy.	5552 - 5595
40	Shale, grayish-green to gray, in part silty and sandy, with considerable dark-greenish- to dark-gray siltstone in part sandy.	5595 - 5635
23	Shale, grayish-green to greenish-gray to gray, in part silty, with some grayish-green to gray siltstone, in part argillaceous.	5635 - 5658
5	No samples.	5658 - 5663
18	Shale, grayish-green to greenish-gray to gray, in part silty and sandy.	5663 - 5681
19	Shale, gray to greenish-gray and grayish- green, with a little dark-grayish-green to dark-greenish-gray siltstone in lower 7 feet.	5681 - 5700
32	No samples.	5700 - 5732
18	Shale, reddish-gray, with a great deal of grayish-green to greenish-gray shale, in part silty.	5732 - 5750
10	Shale, grayish-green to greenish-gray, with considerable greenish- to dark-greenish-gray siltstone.	5750 - 5760
26	Shale, reddish-gray to gray; considerable grayish-green to greenish-gray shale; a little dark-grayish-green to dark-greenish-gray siltstone.	5760 - 5786
10	Shale, greenish-gray to gray and grayish-green, with a little light-greenish- to greenish-gray siltstone.	5786 - 5796
31	Shale, grayish-red-purple; considerable grayish-green to greenish-gray shale; a little light-grayish- to grayish-green siltstone.	5796 - 5827
7	No samples.	5827 - 5834
47	Shale, grayish-red-purple, in part silty; a little light-grayish- to grayish-green shale; a little siltstone, splotched grayish-green and grayish-red-purple.	5834 - 5881
26	Shale, dusky-red- to grayish-red-purple, with a little greenish-gray and grayish-purple siltstone.	5881 - 5907
23	Shale, dusky-red- to grayish-red-purple; some grayish-green shale; a little brick-red shale; a little grayish-green to light-gray siltstone.	5907 - 5930

Thickness Feet	Description of Strata	Depth in feet
12	Shale, grayish-green, in part silty.	5930 - 5942
5	Siltstone, very dark- to light-gray, argillaceous and carbonaceous, with a little grayish-red- purple and grayish-green shale.	5942 - 5947
18	Siltstone and shale, grayish-red-purple; considerable grayish- to light-grayish-green shale and siltstone; a little very dark- to dark-gray shale and siltstone.	5947 - 5965
Total depth		5965

